



Hydrogen Fuel



*Prepared by the
California Department of Food and Agriculture*



In The News

“Schwarzenegger Is Driving Force in Hydrogen Fuel Effort”

Los Angeles Times

“Schwarzenegger Proposes 'Hydrogen Highways' Plan”

KCRA 3

News



“Fuel Of Future' Available In Los Angeles- Hydrogen Station Opens For Cars In Calif.”

FOX 12 News





In The News

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November 15, 2007

Sacramento - Honda Motor Co. has made the announcement on Wednesday that they are going to begin leasing the cars of the future, fuel cell cars, in California. The first car will be the new FCX Clarity hydrogen-fuel-cell-powered car.

A limited number of Southern California drivers will be able to lease this car this coming summer. The price point for a three-year lease will be \$600/month.





Hydrogen Fuel

Overview

- ❖ An alternative fuel which can be part of solution to problems facing California and U.S.
- ❖ Can reduce dependency upon petroleum products, improve air quality and reduce greenhouse emissions
- ❖ Can be used to either power spark-ignition engines or fuel cells



Hydrogen Fuel

- ❖ Fuel cells generate electricity by means of a chemical reaction of hydrogen and oxygen
 - Electricity is used to power an electric motor to propel the vehicle.





Hydrogen Fuel

❖ Several auto manufacturers have developed prototype fuel cell vehicles:



- *Daimler*
- *Ford*
- *General Motors*
- *Honda*
- *Hyundai*
- *Nissan*
- *Toyota*
- *Volkswagen*



Hydrogen Fuel

- ❖ Spark-ignition engines burn hydrogen directly
 - BMW introduced a car that runs on gasoline or hydrogen.



BMW Hydrogen 7



Major Stakeholders

❖ California Fuel Cell Partnership

- Collaboration of 31 organizations, including manufacturers, fuel producers and governmental agencies
- Partnership to promote commercialization of fuel cell vehicles
- CDFA is an associate member



Major Stakeholders

❖ Western States Petroleum Assn. (WSPA) & American Petroleum Institute (API)

- trade associations whose members market, refine and distribute petroleum and natural gas





Major Stakeholders

U.S. Government

- Department of Energy
 - Department of Commerce
 - Department of Transportation
 - Environmental Protection Agency
-
- Working to solve energy security and environmental problems
 - Federal government is funding a number of research projects



Major Stakeholders

❖ California Air Resources Board (CARB)

- ❑ Mission: *To protect the environment*
- ❑ Concerned with impact of fuel and vehicles on air quality and greenhouse gas emissions
- ❑ Working to speed availability of hydrogen fueling stations



Major Stakeholders

❖ California Energy Commission

- ❑ Goal: *Reduce California's dependency upon petroleum*
- ❑ Promote all types of alternative fuels by funding research and infrastructure development



Major Stakeholders

❖ California Department of Food and Agriculture (CDFA)



■ Goal: To ensure quantity and quality of alternative fuels and provide equitable competition in the marketplace.



CDFA Responsibilities

Fuel Quality

California Oil Substitution Act

Established minimum quality standards for petroleum and automotive products in 1931

California Oil Substitution Act

“An act to prevent fraud or misrepresentation in the distribution and sale of gasoline or other motor fuel, distillate, kerosene and lubricating oil; regulating the distribution and sale of such products and the use of brands and trademarks in connection therewith; providing for the licensing of persons, firms, associations or corporations, installing and using motor vehicle fuel pumps; regulating signs, placards, posters, streamers, cards and other advertising media advertising gasoline or other motor vehicle fuel or the price thereof; defining the powers and duties in relation thereto of the Division of Weights and Measures of the Department of Agriculture, and persons authorized by it, sealers of weights and measures, and their deputies and other officers; defining ‘gasoline’ and prescribing specifications for products sold or offered for sale as ‘gasoline’; prescribing penalties for the violation of provisions hereof; and repealing acts and parts of acts inconsistent herewith.”



CDFA Responsibilities

- **Laws expanded and found in CA Business & Professions Code, Chapters 14 and 15**



- **Senate Bill 76 required CDFA to establish standards for hydrogen fuel**



CDFA Responsibilities - Fuel Quality

➤ CDFA and CARB formally agreed to fund development of hydrogen regulations

▣ CARB provided \$310,000 to fund work and purchase research instrumentation





CDFA Responsibilities - Fuel Quality

➤ CDFA developed standards based upon work done by ASTM, ISO, SAE.



▣ Proposed regulations have been filed with the Secretary of State's office.





CDFA Responsibilities - Fuel Quality

- Test methods and sampling techniques are being developed.
- Work is being performed in coordination with ASTM and SAE.





CDFA Responsibilities - Accuracy

Fuel Dispensing Device Accuracy*

Type evaluation process examines:



- ✓ Design
- ✓ Features
- ✓ Operating characteristics
- ✓ Performance to legal requirements

*To date no hydrogen dispenser has been evaluated for commercial use



CDFA Responsibilities - Accuracy



Field verification requires :

- ✓ **Test methods***
- ✓ **Field standards***
- ✓ **Safety training***

***These are currently under development**



CDFA Goals for the Future



Upgrade facilities to accommodate hydrogen testing



Continue research on hydrogen fuel test methods



Evaluate sampling methodology to ensure representative samples are obtained



Monitor hydrogen fuel locations for compliance with California regulations



Clarify existing law related to enforcement activities



**A.G. Kawamura, Secretary CDFA, and
a hydrogen fuel cell automobile**